

# Corrosion Monitor for Concrete

## Betelguard Multi-Depth Sensor (MDS)



**Betelguard**



**Betelguard Multi-Depth Sensor (MDS)** provides an early indication of corrosion events that may lead to a degradation of the integrity of the concrete structure before it becomes a major issue, by tracking chloride penetration into the concrete.

This is achieved by measuring the corrosion conditions at different concrete depths; by placing it next to the steel reinforcement within the concrete, the corrosion ingress from the concrete surface, through the concrete cover, to the rebar depth can be determined.

### Futures

- Monitor chloride or carbonation penetration rate into concrete by detecting its front which migrates from the exposed concrete surface.
- Monitor corrosion activity of the rebar adjacent to the monitor.
- Measure the corrosion rate of each anode element of MDS.
- Cable backup for MDS and Cathode using double cables.
- Stainless steel (SS304) frame body to ensure durability and resist to the high pH concrete environment
- High quality toughened low resistance 6-conductor cables

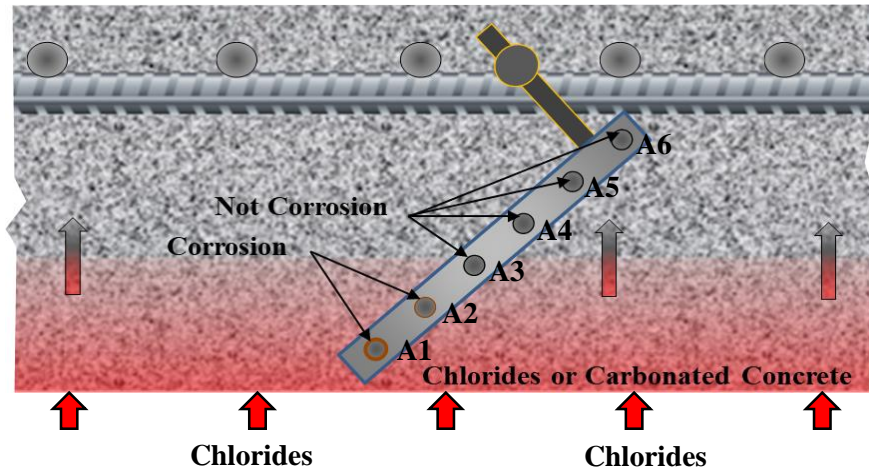
### Specification

Anode Ladder (MDS): (Working Electrode)	Mild steel - 4 steps or 6 steps with two shielded Teflon LiTCT cables on both ends of each anode (50 mm long by 10 mm in dia.)
Cathode: (Counter Electrode)	Platinized or MMO titanium rod (8 mm Dia. x 400 mm long) with two shielded Teflon LiTCT cables on both ends
Frame:	Stainless steel (SS304), IP 67
Design Life:	Min. 50 years

Note: Cathode can be included in the MDS frame upon request.



## Principle of MDS



Showing Anodes (A1, A2 and A#) are corroding by chloride penetration.

## Installation

Any steel anode elements should not be in contact to reinforcing steel to avoid electrical short circuits.

### Position in Concrete

- Multi-depth Monitors shall be installed in high corrosion risk areas. The concrete cover for the most outer anode element (A1) should be approx. 15 mm from the exposed concrete surface by adjusting the monitoring stand level.
- The most inner anode element (A6) should be positioned at the same or near the depth of the structural reinforcing steel.
- The cables from Multi-depth Monitor shall be directly fixed on the rebar behind, avoiding any damages. When the cables are not located underneath of rebars, heavy wall PVC conduit should be used to protect the cable from a concrete vibrator.

## Monitoring

1. Measure and record the voltage difference between Cathode and A1.
2. Repeat Measurement 1 for A2 to A6 and record the data.
3. Measure the corrosion rate of each anode element by the MUI portable LPR meter.
  - Counter Electrode: platinized titanium rod (cathode)
  - Working Electrode: any anode element (A1, A2, ... A6)
  - Reference Electrode: Ag-AgCl or MnO Electrode